

Official Amendment

Serial No. - 10/625,915

Docket No. - UVD 0280 IA / UD 268

REMARKS

Claims 1-166 were pending in the present application. Claims 1, and 163 have been amended. As support for these amendments is provided for by the specification, no new matter has been entered. Claims 14-36, 41, 42, 47-162, and 164-166 were withdrawn from consideration. As a result of this amendment, claims 1-13, 37-40, 43-46, and 163 are pending. Reexamination and reconsideration are requested in light of the accompanying amendments and remarks.

The rejection of claims 1, 4-5, 8-13, 37-40, and 163 under 33 U.S.C. § 102(b) as being anticipated by PCT publication WO 98/48075 (treated as equivalent to U.S. Patent No. 6,200,672 to Tadokoro) has been overcome. Tadokoro teaches "a surface treated metal sheet which is coated with a layer comprising as main components, a *complex and/or salt* between a *rare earth metal element and an organic compound* having in the molecule one or more functional groups selected from among -O-, =O, -OH, -COOH, -NH₂, -NH, =N-, -SH, -SO₃H and phosphoric groups, and a *matrix which physically holds the above and has adhesive power for metal sheets*, as well as a metal surface treatment solution used therefore." Abstract.

According to the examiner, "Tadokoro teaches an aqueous metal surface treatment fluid comprising a rare earth element such as tetravalent cerium (col. 5 lines 6-9) and oxyacid anions such as phosphate, tungstate, vanadate anions, wherein the rare earth metal elements and the oxyacid anions form oxyacid compounds (col. 9 lines 28-33)." However, col. 5, lines 6-9, and col. 9, lines 28-33 refer to different components of the coating. One component is a *complex and/or salt* between a rare earth element and an organic compound having certain functional groups (rare earth metal complex). The second component is a *matrix* capable of holding the rare earth metal complex and having adhesive power for metal sheets. See Abstract, col. 3, lines 12-20 and 61-67, col. 13, lines 43-55, and Tables 1 and 2. The discussion at col. 5, lines 6-9 refers to the first component, the rare earth metal complex. See col. 4, line 52 to col. 5, line 35, and col. 10, line 64 to col. 11, line 48. The discussion at col. 9, lines 28-33 refers to the second

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component, the matrix. See col. 7, lines 46-60, col. 9, lines 26-43, col. 10, lines 4-8, col. 12, line 43 to col. 13, line 42.

The examiner also stated that “Tadokoro further teaches a rare earth metal complex comprising rare earth elements such as tetravalent cerium and an inorganic compounds [sic] such as phosphates, nitrates and sulfates (col. 5 lines 27-31).” However, col. 5, lines 27-31 does not refer to a complex between a rare earth metal and an inorganic compound. As explained at col. 5, lines 24-27, the rare earth metal complex (i.e., the complex and/or salt between a rare earth element and an *organic* compound) can have an inorganic compound as a ligand. “In the case of a complex, there is no problem if it *also contains an inorganic compound as a ligand in addition to the organic compound.*”

With respect to claims 1 and 11-13, the examiner stated that “the tetravalent cerium of Tadokoro reads on the claimed rare earth element and the phosphate, tungstate, vanadate, sulfate and nitrate of Tadokoro read on the claimed inorganic valence stabilizer. The oxyacid compound or the rare earth metal complex of Tadokoro reads on the rare earth/valence stabilizer.” However, Tadokoro does not teach a conversion coating, as claimed. A conversion coating is formed during intentional exposure of metal to a chemically reactive solution. The metal is exposed to a compound that chemically alters the surface and forms a coating that provides a high degree of corrosion resistance. The protective film is produced by a chemical redox reaction between the metal surface and the conversion coating solution. See p. 2, line 15 to p. 3, line 16. Tadokoro teaches applying a layer comprising as major components a rare earth metal complex, and a matrix. The matrix physically holds the rare earth metal complex, and has adhesive power for metal sheets. See Abstract, and col. 7, lines 45-49. Some matrix materials are said to control corrosion by their barrier effect, with excess oxyacid forming oxyacid salt layer-type passive layers or oxide layer-type passive layers. See col. 9, lines 34-43. A bath is prepared by combining the rare earth metal complex and layer matrix. Col. 13, lines 44-55. The treatment baths were coated onto a steel sheet using a bar coater and dried. Col. 15, lines 35-53. The layer contains the complex and/or salt of an organic compound and rare earth metal element

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in a matrix, as shown in Fig. 1, Item 3. Tadokoro's matrix holds the rare earth metal complex, but neither the rare earth metal complex nor the matrix reacts with the surface to form the layer. It is simply a layer deposited on the metal surface. Thus, it is not a conversion coating, as claimed.

As to claim 8, the examiner stated that "Tadokoro further teaches the coated metal surface can be further covered by an over coat layer (col. 10, lines 35-38). Since Tadokoro teaches the same rare earth/valence stabilizer complex as claimed in its coating fluid, the coating solution of Tadokoro inherently has the same adhesion enhancing morphology as claimed." As discussed above, Tadokoro does not teach a conversion coating, but rather a layer of a matrix containing a rare earth metal complex and/or salt which is coated on the metal surface. Such a surface coating does not inherently have the morphology of any type of conversion coating.

With respect to claims 9-10, the examiner stated that "Tadokoro teaches vanadate anion and cerium forming an oxyacid compound. Therefore, the vanadium ion reads on the claimed additional ion. Since the oxyacid compound of Tadokoro reads on the claimed rare earth/valence stabilizer, the examiner asserts that the rare earth/valence stabilizer as taught by Tadokoro inherently has a central cavity containing cerium as claimed." However, claim 9 recites that the "rare earth/valence stabilizer complex has a central cavity containing a cerium, praseodymium, or terbium ion and an additional ion." The vanadium ion in a cerium/vanadate complex is not an additional ion in the central cavity, as claimed. As discussed on p. 170, lines 1-19, the central cavity of the heteropolymetallates can contain an ion in addition to cerium. Examples include silicomolybdates, phosphomolybdates, silicotungstates, and phosphotungstates. In these complexes, the central cavity contains a Si^{+4} or P^{+5} ion in addition to the cerium ion. The molybdenum or tungsten is not in the central cavity; rather, it forms the central cavity. Thus, with a cerium/vanadate complex as described in Tadokoro, the vanadium is not in the central cavity, as claimed.

With respect to claims 37-40, the examiner stated that "Tadokoro teaches the presence of cerium ions which read on the claimed cationic solubility control agent. Tadokoro further

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teaches the presence of calcium, zinc, lanthanum, hydrogen, zirconium, and titanium ions (col. 10, lines 9-18) which also read on the claimed cationic solubility control agent.”

Tadokoro does not teach the use of solubility control agents as claimed. As discussed at p. 338, line 5 to p. 344, line 8, one of the roles of the valence stabilizer is to allow for formation of a tetravalent cerium, praseodymium, or terbium complex that has a specific solubility range. The anions or cations present in the coating solution may be sufficient to form a Ce^{+4} , Pr^{+4} , or Tb^{+4} -containing compound within the conversion coating that exhibits the desired solubility characteristics. Additional solubility control may be desirable to optimize the performance of the tetravalent cerium-, praseodymium-, or terbium-valence stabilizer complex. The initial formation of the conversion coating may produce Ce^{+4} , Pr^{+4} , or Tb^{+4} compounds with solubilities greater than optimal. Additional solubility control agents applied to a workpiece can enhance the Ce^{+4} , Pr^{+4} , or Tb^{+4} content of the coating by forming more insoluble compounds in place. Additional solubility control agents are typically applied as a second solution.

Tadokoro teaches that the layer and the treatment solution can include some additional materials.

There may also be added to the layer and treatment solution of the invention phosphoric acid or polyphosphoric acid as *passivation layer-forming aids*, or calcium hydroxide, calcium carbonate, calcium oxide, zinc phosphate, potassium phosphate, calcium phosphate, lanthanum phosphate, lanthanum hydrogen phosphate, cerium phosphate, cerium hydrogen phosphate, calcium silicate, zirconium silicate, aluminum phosphate, zirconium phosphate, TiO_2 , SiO_2 , Al_2O_3 , La_2O_3 , CeO_2 , etc. as *additional additives*.

Col. 10, lines 10-18. Tadokoro teaches the use of certain compounds as passivation layer-forming aids, and others as additional additives in its layer. Tadokoro's compounds are not solubility control agents. They do not alter the solubility of the cerium-, praseodymium-, or terbium-valence stabilizer complex. They are simply additional components in the layer.

Therefore, claims 1, 4-5, 8-13, 37-40, and 163 are not anticipated by Tadokoro.

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The rejection of claims 1, 4-5, 8-13, 37-40, 43-45, and 163 under 33 U.S.C. § 102(b) as being anticipated by DePue (U.S. Patent No. 5,322,560) has been overcome. DePue teaches a corrosion inhibitor compound for treating aluminum flake pigment. The corrosion inhibitor compound is the reaction product of a water-soluble metal salt including metals selected from the group consisting of yttrium and rare earth metals and an anionic metal salt including transition metal oxo-complexes and soluble salts of silicon and mixtures thereof. Abstract.

According to the examiner, DePue teaches that the "corrosion inhibitor compound comprises a rare earth metal such as tetravalent cerium (col. 2 lines 55-60), a silicon salt and a metal oxo-complexes [sic] of Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, and W (col. 2 lines 27-36, col. 3 lines 17-22)." The corrosion inhibitor of DePue is described at col. 2, lines 27-36, and col. 3, lines 17-22. However, the compounds described at col. 2, lines 55-59 are different compounds (water-soluble) which can be used as primary corrosion inhibitors in combination with DePue's claimed corrosion inhibitor (slightly soluble) which would be a secondary corrosion inhibitor.

The corrosion inhibitors of the present invention are also useful when *used in combination with water-soluble metal salts of yttrium and the rare earth metals. Particularly useful salts include trivalent cerium, yttrium and lanthanum salts and tetravalent cerium salts.*

These salts are discussed further at col. 4, lines 34-55.

The slightly soluble corrosion inhibitor of the present invention is also useful in aqueous coating compositions containing aluminum flake pigment. The corrosion inhibitor is particularly effective in coating compositions when used as a secondary corrosion inhibitor in combination with *a primary corrosion inhibitor which is a water-soluble salt of trivalent or tetravalent salt of cerium, yttrium or lanthanum.* Water-soluble salts useful as a primary corrosion inhibitor compound for treating the aluminum pigment include cerium sulfate, cerium triacetate, cerium isopropoxide, ammonium cerium nitrate, yttrium triacetate, lanthanum triacetate and cerium nitrate.

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When used in combination in a coating composition, *the water soluble metal salt used as the primary corrosion inhibitor* is present in an amount of between 0.01% and 5.0% by weight based on total pigment weight and *the slightly soluble salt used as the secondary corrosion inhibitor* is used in an amount between 0.01% and 5.0% by weight based on the combined weight of the corrosion inhibitor and pigment.

Thus, the only tetravalent rare earth compounds described in DePue are *salts*, not *rare earth/valence stabilizer complexes*, as claimed. These salts are highly soluble in water, and fall above the solubility parameters specified in the claims. In fact, several of the salts mentioned are identified in the application as being suitable cerium sources: cerium sulfate, cerium triacetate, ammonium cerium nitrate and cerium nitrate. See p. 345, line 15 to p. 346, line 2, and Table 3.

In addition, DePue's corrosion inhibitor is not a conversion coat, as claimed. DePue's corrosion inhibitor compounds inhibit corrosion in aluminum flake pigment particles in a basic aqueous environment. Aluminum flake pigment treated with the corrosion inhibitor compound inhibits corrosion of the pigment particles in water-borne coating compositions. See col. 1, lines 54-66, and col. 2, lines 8-12.

The corrosion inhibitors are formed by reacting the water-soluble metal salt of yttrium, or rare earth metals with a transition metal oxo-complex or a silicate salt in aqueous solution. The resultant reaction product is then filtered and oven dried. See col. 3, lines 23-29. The aluminum flake pigment particles are treated with the corrosion inhibitor by forming a slurry of the aluminum pigment and a corrosion inhibitor and water. The pigment remains in mixture with the solution for 0.5 to 4 hrs to form the protective coating of the corrosion inhibitor on the aluminum flake pigment. The contact time must be adequate for formation of a rare earth metal or transition metal oxide coating on the aluminum flake pigment. See col. 2, lines 37-45, and col. 3, lines 35-62, and Examples.

Most of the time, the corrosion inhibitor is unreacted in the form of a precipitate due to its relatively insoluble nature. It provides an additional source of rare earth metal to form a metal oxide protective coating at any site left unprotected by the metal oxide film provided by the more

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soluble trivalent and tetravalent salts of the primary corrosion inhibitor. Col. 4, line 56 to col. 5, line 9.

As discussed above, conversion coatings are formed during intentional exposure of metal to a chemically reactive solution. The metal is exposed to a compound that chemically alters the surface and forms a coating that provides a high degree of corrosion resistance. The protective film is produced by a chemical redox reaction between the metal surface and the conversion coating solution. See p. 2, line 15 to p. 3, line 16. In DePue, when a site becomes unprotected by the metal oxide film provided by the more soluble trivalent and tetravalent salts of cerium, yttrium and lanthanum, the corrosion inhibitor precipitate acts as a source of rare earth, yttrium, or transition metal to form a metal oxide protective coating on the pigment. Col. 4, line 56 to col. 5, line 9. Thus, DePue's corrosion inhibitors are not conversion coats, as claimed.

As to claim 8, the examiner stated that "DuPue further teaches the coated metal surface can be further covered by a clear coat over coat layer (col. 6, lines 61-63). Since DePue teaches the same rare earth/valence stabilizer complex as claimed in its coating fluid, the coating solution of Tadokoro [sic] inherently has the same adhesion enhancing morphology as claimed." As discussed above, DePue does not teach a conversion coating, but rather a coating containing treated aluminum flake particles, such as a base coat for a color-plus-clear composite coating. Such a surface coating does not inherently have the morphology of any type of conversion coating.

With respect to claims 9-10, the examiner stated that "since DePue teaches the claimed rare earth/valence stabilizer complex, it also inherently teaches the central cavity containing cerium as recited in instant claim 9. In addition, the metal oxo-complexes (i.e. valence stabilizer) as taught by DePue contains Ti, Zr, V, Cr ions, which read on the claimed additional ions as recited in instant claims 9-10." However, as discussed above, the central cavity of the heteropolymetallates can contain an ion in addition to cerium. Examples include silicomolybdates, phosphomolybdates, silicotungstates, and phosphotungstates. In these complexes, the central cavity contains a Si^{+4} or P^{+5} ion in addition to the cerium ion. The

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molybdenum or tungsten is not in the central cavity; rather, it forms the central cavity. Claim 9 recites that the “rare earth/valence stabilizer complex has a central cavity containing a cerium, praseodymium, or terbium ion and an additional ion.” The Ti, Zr, V, and Cr ions in the metal oxo-complexes are not additional ions in the central cavity as claimed.

With respect to claims 37-40, DePue does not teach the use of solubility control agents as claimed. As discussed above, one of the roles of the valence stabilizer is to allow for formation of a tetravalent cerium, praseodymium, or terbium complex that has a specific solubility range. The anions or cations present in the coating solution may be sufficient to form a Ce^{+4} , Pr^{+4} , or Tb^{+4} -containing compound within the conversion coating that exhibits the desired solubility characteristics. Additional solubility control may be desirable to optimize the performance of the tetravalent cerium-, praseodymium-, or terbium-valence stabilizer complex. The initial formation of the conversion coating may produce Ce^{+4} , Pr^{+4} , or Tb^{+4} compounds with solubilities greater than optimal. Additional solubility control agents applied to a workpiece can enhance the Ce^{+4} , Pr^{+4} , or Tb^{+4} content of the coating by forming more insoluble compounds in place. Additional solubility control agents are typically applied as a second solution.

The examiner stated that “[i]n addition, the Ce, Ti, Zr, V, Cr, W, Mo, Nb, Hf, Ta as taught by DePue also read on the claimed cationic solubility control agent.” Because the examiner has not provided a citation to DePue, Applicants are unable to determine what this statement refers to. Applicants did not find all of these elements listed together anywhere in DePue. Therefore, Applicants respectfully request clarification.

With respect to claims 44-45, the Examiner cited col. 6, lines 12-28 as showing “a color brightener . . . which read [sic] on the agent for improving color fastness.” However, DePue does not teach a color brightener.

It may be desirable to include small amounts of *rheology control agents*, for example fumed silicas, hectorite clays, bentonite clays, or cellulose acetate butyrate. Such materials are usually used at levels of less than 10% based on the total solid weight of reactants. *Rheology control agents are used to control the flow and*

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leveling of the composition during application and curing steps. The rheology control agent is also for controlling the metallic appearance of the coating. Such materials may help "fix" the pigment flake surface in an alignment parallel to the surface of the coating to maximize the brightness when viewed head-on and to maximize the darkness when viewed obliquely.

DePue teaches the use of rheology control agents which control the flow of the material during application and curing. They can also help to align the aluminum pigment flake surface parallel to the surface of the coating. However, this alignment does not improve color-fastness of the coating. Thus, DePue does not teach "an agent which improves color-fastness of the conversion coating," as claimed.

Therefore, claims 1, 4-5, 8-13, 37-40, 43-45 and 163 are not anticipated by DePue.

The rejection of claims 2-3, and 6-7 under 33 U.S.C. § 103(a) as being unpatentable over Tadokoro is respectfully traversed. Tadokoro does not teach or suggest the limitations of claim 1, as discussed above. Therefore, claims 2-3, and 6-7 would not have been obvious to one of skill in the art at the time the invention was made over Tadokoro.

The rejection of claims 43-46 under 33 U.S.C. § 103(a) as being unpatentable over Tadokoro in view of Dattilo (U.S. Patent No. 6,291,018) is respectfully traversed. Dattilo is cited as teaching "a metal surface treatment coating composition comprising color pigments such as carbon black and phthalocyanines." However, Dattilo does not remedy the deficiencies of Tadokoro. Therefore, claims 43-46 would not have been obvious to one of skill in the art at the time the invention was made over Tadokoro in view of Dattilo.

The rejection of claims 2-3, and 6 under 33 U.S.C. § 103(a) as being unpatentable over DePue is respectfully traversed. DePue does not teach or suggest the limitations of claim 1, as discussed above. Therefore, claims 2-3, and 6 would not have been obvious to one of skill in the art at the time the invention was made over DePue.

The rejection of claim 46 under 33 U.S.C. § 103(a) as being unpatentable over DePue in view of Dattilo is respectfully traversed. Dattilo is cited as teaching "a metal surface treatment

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coating composition comprising color pigments such as carbon black and phthalocyanines.” However, Dattilo does not remedy the deficiencies of DePue. Therefore, claim 43 would not have been obvious to one of skill in the art at the time the invention was made over DePue in view of Dattilo.

The rejection of claims 1-13, 37-40, 43-46, and 163 under the judicially created doctrine of obviousness-type double patenting over claims 1-11, 35-38, 41-47, 51-55, and 137 of copending Application Serial No. 10/625,886 has been overcome by the filing of a terminal disclaimer.

The rejection of claims 1-13, 37-40, 43-46, and 163 under the judicially created doctrine of obviousness-type double patenting over claims 1-5, 8-12, 36-39, 43-45, and 102 of copending Application Serial No. 10/625,885 has been overcome by the filing of a terminal disclaimer.

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CONCLUSION

Applicants respectfully submit that, in view of the above amendment and remarks, the application is now in condition for allowance. Applicants respectfully request that claims 1-13, 37-40, 43-46, and 163 be passed to allowance.

If the Examiner has any questions or comments regarding the present application, he is invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,
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